Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter of	
Allocation of Spectrum Below 5 GHz Transferred from Federal Government Use	ET Docket No. 94-32

TO: The Commission

REPLY COMMENTS OF INTERNATIONAL BUSINESS MACHINES CORPORATION

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June 30, 1994

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SUMMARY

The Commission has asked for comment regarding the reallocation of various frequencies identified by NTIA for withdrawal from Federal Government use. As the comments make clear, the 2402-2417 MHZ band selected by NTIA for reallocation does not satisfy the statutory criteria that NTIA was directed to use in making its selection. Reallocation of this band to additional commercial use would seriously jeopardize the continued viability of spread spectrum devices, such as the newly developed IBM Wireless LAN, which presently promise to play a significant role in the developing information superhighway. On the other hand, this band will be of little utility to additional commercial users. Accordingly, IBM urges that the Commission recommend to NTIA that NTIA designate frequencies other than this band for withdrawal from Federal use. Should NTIA decline to do so, IBM urges that the Commission allocate the 2402-2417 MHz band in a manner that gives interference protection priority to incumbent users, including Part 15 users.

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International Business Machines Corporation ("IBM") submits these Reply Comments in the above-referenced proceeding.[1/] IBM's interests will be directly affected by the Commission's decision in this proceeding. IBM recently announced that it will begin shipment of the IBM Wireless LAN (Local Area Network), a spread spectrum device that will operate in the ISM band. As the NOI recognizes, such unlicensed spread spectrum devices have been authorized to operate on these frequencies since 1985.[2/] Performance of the IBM Wireless LAN may be significantly impaired if additional commercial users are crowded

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1/ Allocation of Spectrum Below 5 GHz Transferred from Federal Government Use, 9 FCC Rcd 2175 (1994) (*hereinafter* "NOI"). In the NOI, the Commission sought comment on the possible reallocation of 50 MHz of spectrum from use by the Federal Government to use by the private sector. In this Reply, IBM addresses only those comments concerning the reallocation of the 2402-2417 MHz portion of the ISM band.

2/ See NOI, 9 FCC Rcd at 2176 n.14.

into this portion of the spectrum as a result of its reallocation from Federal Government use.

As we show below, based on the comments filed in this proceeding, reallocation of the 2402-2417 MHz band to additional commercial use is inconsistent with Congressional intent. IBM therefore requests that, pursuant to the procedures afforded by the Omnibus Budget Reconciliation Act of 1993, the Commission recommend to the National Telecommunications and Information Administration ("NTIA") that it modify the conclusions of its preliminary report and designate frequencies other than this band for withdrawal from Federal use. Should NTIA decline to do so, IBM urges that the Commission allocate the 2402-2417 MHz band in a manner that gives interference protection priority to incumbent users, including Part 15 users.

I. THE COMMENTS DEMONSTRATE THAT REALLOCATION OF THE 2402-2417 MHZ BAND IS INCONSISTENT WITH CONGRESSIONAL INTENT.

In directing that 200 MHz of spectrum be reallocated from Federal Government use to private sector use, Congress set out five criteria that NTIA was to use in identifying the spectrum to be transferred.[3/] The record of this proceeding

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[3/] The reallocation of spectrum was mandated by Congress in the Omnibus Budget Reconciliation Act of 1993, Pub. L. No. 103-66, § 6001, 107 Stat. 312 (1993). Section 113(a) of the Act required that NTIA identify spectrum for transfer from public to private use that: (1) is primarily allocated for government use; (2) is not required to meet the needs of the Federal Government; (3) can feasibly be made available for private sector use; (4) if transferred, will not result in costs that outweigh the benefits of private use; and (5) has its

demonstrates that the transfer of the 2402-2417 MHz band would be inconsistent with four of the five criteria, and that the Commission should, in its report to NTIA, urge NTIA to modify its reallocation decision accordingly.[4/]

First, NTIA was to select spectrum that was for Federal Government use on a primary basis. Although the 2402-2417 MHz band has been allocated to government radiolocation service, private ISM devices also enjoy primary status on this band.[5/] Therefore, as the comments have recognized, "[t]he surrender of this 2402-2417 MHz band by the Federal Government is in many respects a 'hollow' reallocation in that the Federal Government operations were always secondary to ISM. . . . No opening really exists for the introduction of a new licensed service in the 2402-2417 MHz band despite the Federal Government's vacation of the band."[6/]

Second, NTIA was to select spectrum that could feasibly be made available for private sector use. But, as noted above, existing private use of the 2402-2417 MHz band seriously

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greatest potential for productive uses if allocated for non-Federal use.

[4/] IBM notes that, for similar reasons, the Telecommunications Industry Association ("TIA") and Motorola have urged NTIA to reconsider its initial selection of spectrum for immediate reallocation. See TIA Comments to NTIA (filed May 11, 1994); Motorola Comments to NTIA (filed May 11, 1994).

[5/] See 47 C.F.R. § 2.106.

[6/] Comments of The Southern Company at 7; see also Comments of Motorola, Inc. at 6 ("2402-2417 MHz is already heavily used for non-government operations")(emphasis in original).

limit its value for additional private uses. Thus, as numerous comments explain, this band is not well-suited to such uses.[7] For example, Motorola concludes that the bands identified for immediate transfer "hold little promise in satisfying anything other than localized area communications systems providing communications service over short ranges."[8] Pacific Telesis concurs: "Interference concerns severely limit the feasibility of new commercial services in this band."[9]

Most significantly, NTIA was to select spectrum that, if transferred, would not result in loss of service in excess of the benefit of non-Federal use. The 2402-2417 MHz block is located within the band currently allocated for Industrial, Scientific and Medical ("ISM") applications, amateur radio, and unlicensed low-power communications devices operating under Part 15 of the Commission's rules.[10] The ISM equipment

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[7] See, e.g., Comments of the Amateur Radio Council of Arizona (band does "NOT provide potential for economic growth because it is already heavily used"); Comments of APCO at 6 (this band "encumbered by widespread use of microwave ovens and other ISM devices"); Comments of the California Public-Safety Radio Association, Inc. (interference in this band would be "especially devastating to critical Public Safety communications"); Comments of the Industrial Telecommunications Association, Inc. at 5 (interference will impede development of non-Federal systems); Comments of Cornell University and the National Astronomy and Ionosphere Center (commercial use may interfere with radio astronomy).

[8] Motorola Comments at 2.

[9] Comments of Pacific Bell and Nevada Bell at 5.

[10] See Table of Frequency Allocations, 47 C.F.R. § 2.106; see also 47 C.F.R. §§ 15.247 & 15.249.

operating in this band includes household microwave ovens, which generate emissions broadly in the 2450 MHz range.[11/]

Some of the devices operating in this spectrum use, or will use, spread spectrum modulation to avoid interference.[12/] Both NTIA and the Commission have recognized that a wide range of consumer and business applications exists for spread spectrum devices.[13/] And although two other bands are available to spread spectrum devices (902-928 MHz and 5725-5850 MHz), "it is likely that use of [the 2400 MHz] band by spread spectrum devices will increase."[14/] First, only this band includes frequencies that are available for such use worldwide. Second, the other two bands have serious technical or marketing disadvantages for spread spectrum devices. For example, the 902-928 MHz band is already crowded with, among other things, cordless telephones and wireless bar code scanners. In addition, portability, a key

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11/ NOI, 9 FCC Rcd at 2176. Although this radiation is at its greatest at 2450 MHz, it is significant from approximately 2425 MHz to 2475 MHz. See Preliminary Spectrum Reallocation Report, Appendix E (Feb. 1994)(*hereinafter* "NTIA Report").

12/ Instead of transmitting a high-power, narrowband signal, spread spectrum transmission distributes data over a wide frequency band at low power, making it nearly transparent to most spectrum analysis equipment and allowing many users to coexist on the same spectrum.

13/ See NOI, 9 FCC Rcd at 2176 n.14; NTIA Report, at 3-12 & 13.

14/ NOI, 9 FCC Rcd at 2176 n.14; see also NTIA Report at 4-16. IBM agrees with the comments of the "Part 15 Coalition" to the extent that they attribute much of the early success of commercial spread spectrum equipment to the "Commission's foresight in establishing a regulatory environment that permitted innovation in the ISM bands." Comments of the Part 15 Coalition at 3.

marketing consideration for wireless LANs, would be undermined by the relatively large antenna necessary to receive signals in that band. Conversely, the technology to build an efficient portable wireless LAN system in the 5725-5850 MHz band is not commercially viable. As a result, IBM believes that allocation of the 2402-2417 MHz band to additional users would seriously jeopardize the continued viability of spread spectrum devices, which presently promise to play a significant role in the developing information superhighway.

In response to the NOI, the Commission has received several comments raising these concerns.[15/] For instance, InterDigital warns that innovation in spread spectrum technology will be seriously curtailed if the Commission reallocates the 2402-2417 MHz band.[16/] GEC Plessey notes that licensing new users in this block of spectrum "will adversely affect US competitiveness."[17/] Apple concludes that transfer of this band would leave "essentially no usable spectrum in the near term for the wireless information industry."[18/] In short, the record demonstrates that transfer of the 2402-2417 MHz band to private use would be inconsistent with a fourth statutory goal (i.e., ensuring that the costs do not outweigh the benefits of private

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15/ See, e.g., Comments of Symbol Technologies, Inc.; Comments of Apple Computer, Inc.; Comments of InterDigital Communication Corporation; Comments of AT&T Corp.

16/ InterDigital Comments at 3.

17/ Comments of GEC Plessey Semiconductors, Inc. at 1.

18/ Comments of Apple Computer, Inc. at 3.

use) because it provides minimal benefit to other private services and puts at risk one of the most promising new technologies available today.

Wireless LANs promise to provide significant consumer and public benefits. One estimate places the overall annual cost of installing or relocating the wiring for office LANs at $1 billion.[19/] Moreover, without cables, LANs can support users who need access to computers but who often work away from a desk.[20/] Wireless LANs can also play a major role in integrating schools and hospitals into the national information infrastructure, a goal the Administration has described as "paramount."[21/] Chairman Hundt has endorsed the goal of "connecting every classroom, hospital, and library to the national information infrastructure by the year 2000."[22/] In many schools, rewiring is either impractical because of the age or condition of the buildings, or dangerous because of asbestos. Similarly, wireless LANs will be used by hospitals, to improve

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19/ Dryden, LANs Go Wireless with Technology Advances, LAN Times, Oct. 22, 1990, at 23.

20/ InfoWorld, Study Projects Wireless Growth (June 6, 1994).

21/ Remarks of Vice President Al Gore at the National Press Club at 9 (Dec. 21, 1993).

22/ Statement of Chairman Reed E. Hundt Before the House Subcommittee on Telecommunications and Finance of the Committee on Energy and Commerce on H.R. 3636 and H.R. 3626 at 2-3 (Jan. 27, 1994); see also Statement of Chairman Reed E. Hundt En Banc Hearing on Children's Television (June 28, 1994)("President Clinton has called for us to connect every classroom in the country to the information superhighway by the end of the decade.").

patient care and lower costs.[23] Industry consultants have advised IBM that the world market for wireless LANs will grow from approximately $200 million in 1994 to as much as $1.2 billion by 1997. Other sources are consistent with these estimates.[24]

IBM announced only two weeks ago that it would begin delivery of the first IBM Wireless LANs, which will operate in the 2400-2483.5 MHz band and enable users to connect workstations without cabling. The IBM Wireless LAN uses Frequency Hopping ("FH") as its mode of spread spectrum transmission. In addition, it includes a dynamic interference avoidance mechanism (patent pending), which detects interference and changes the system's hopping patterns to avoid interfering signals. The segment below 2402-2417 MHz (2400-2402 MHz) is primarily used by amateur radio operators. And frequencies between 2417 MHz and 2483.5 MHz are less suitable for low-power wireless devices because of the presence of microwave oven emissions that peak at 2450 MHz. Thus, the IBM Wireless LAN was designed with the expectation that it would find open channels most often in the 2402-2417 MHz band.

IBM has made a significant financial and human resources investment in the development of the IBM Wireless LAN. IBM relied on the prevailing regulatory environment in making this investment; it "consider[ed] the proximity and the high

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[23] See NTIA Report, at 3-12.

[24] See InfoWorld, Study Projects Wireless Growth (June 6, 1994); Bruce Caldwell, Wireless LANs Add Appeal, InformationWeek (June 27, 1994).

power of non-Government licensed radio stations, such as broadcast, amateur and land mobile stations, and of U.S. Government radio stations when choosing operating frequencies during the design of [its] equipment so as to reduce the susceptibility for receiving harmful interference."[25/] It therefore designed the IBM Wireless LAN with special design attributes that, as noted above, allow it to operate without substantial interference from amateur radio operators and other ISM equipment currently operating in the 2400 MHz band. Additional uses of the 2402-2417 MHz band by licensed devices would effectively channel the IBM Wireless LAN into the upper portion of the ISM band, which, as the Commission knows, is already significantly cluttered with microwave oven emissions. Although the IBM Wireless LAN may be able to function in this environment (because of its superior interference avoidance capabilities), its attractive highspeed features would be substantially impaired.

In its preliminary report, NTIA recognizes that wireless LAN technology (using the 2402-2417 MHz spectrum block) will provide significant consumer benefits and that interference with licensed devices will be likely if this band is transferred.[26/] Nonetheless, NTIA concludes that "greater attention during device design to interference susceptibility" is needed and that Part 15 device suppliers should "warn buyers of

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[25/] 47 C.F.R. § 15.17(a).

[26/] See NTIA Report at 3-12 to 3-15.

interference potential."[27] But the IBM Wireless LAN is well beyond the design stage. IBM has already developed the product with exceeding attention to interference susceptibility -- in accordance with the Commission's rules. The interference problems at issue here would not be a function of poor device design, but would result from the addition of new users on this band, which no device designer could reasonably have anticipated. And the notion that a warning can substitute for system performance at this stage is simply unrealistic. Thus, to allocate these frequencies now to other uses that would have priority over such incumbent uses adopted after substantial investments would impose serious restraints upon implementation of these leading-edge systems.

II. IN THE EVENT THAT NTIA DOES NOT MODIFY ITS POSITION, IBM URGES THAT THE COMMISSION ALLOCATE THE 2402-2417 MHz BAND IN A MANNER THAT WILL GIVE PRIORITY TO INCUMBENT USERS, INCLUDING PART 15 USERS.

The Reconciliation Act requires that the Commission issue regulations within 18 months after enactment (i.e., by February 10, 1995) to allocate the frequencies made immediately available pursuant to the expedited reallocation provisions of Section 113(e)(2). In the NOI, the Commission sought public comment to help it "ensure that spectrum reallocated for private use will provide for the introduction of new services and the

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[27] Id. at 3-14.

enhancement of existing services."[28] Based on all of the foregoing, IBM maintains that the 2402-2417 MHz band holds little promise for the introduction of new services, and that allocation of that band for additional commercial uses would stifle, rather than enhance, important spread spectrum technologies for wireless LANs. If NTIA nevertheless adheres to its position, IBM urges that the Commission allocate the 2402-2417 MHz band in a manner that provides interference protection priority to such incumbent users.

CONCLUSION

The selection of the 2402-2417 MHz band for transfer to non-Federal use is clearly inconsistent with congressional intent. Accordingly, IBM respectfully requests that the Commission recommend to NTIA that NTIA modify the conclusions in its preliminary report and designate frequencies other than this band for withdrawal from Federal use. Should NTIA decline to do

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[28] NOI, 9 FCC Rcd at 2175.

so, IBM urges that the Commission allocate the 2402-2417 MHz band in a manner that gives interference protection priority to incumbent users, including Part 15 users.

Respectfully submitted,

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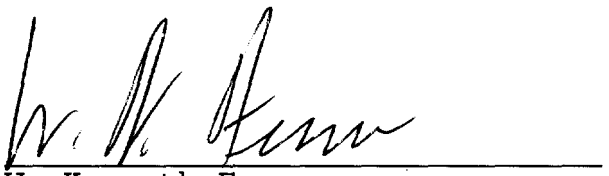
June 30, 1994

CERTIFICATE OF SERVICE

I, W. Kenneth Ferree, hereby certify that I have this 30th day of June, 1994, caused to be delivered by first-class mail (except as noted) the foregoing Reply Comments of International Business Machines Corporation to the persons named on the attached service list.



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